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ABSTRACT

This manual for a workshop on the use of telecommunications in the schools begins by presenting a connection decision chart, the session objectives, and the agenda. Information presented for the workshop covers the basic concepts and elements of telecommunications; the specific elements of a telecommunications system; the evaluation and selection of hardware and software; the evaluation and selection of online services; and typical dial-up sessions with the University of Missouri's LUMIN library catalog, the Missouri School Boards Association's EDNET bulletin board system, and CompuServe. Objectives and procedures are then provided for four hands-on activity sessions: (1) IBM dial-up using ProComm+ to access a remote online service; (2) data transfer between a TRS-80 laptop computer and an IBM PS/2 Model 25 to demonstrate how information can be passed from one ASCII machine to another ASCII machine with differing operating systems; (3) Apple hardware/software setup and configuration; and (4) IBM hardware/software setup and configuration. A glossary of telecommunications terminology, a computer telephone book for Missouri, and a list of selected computer bulletin boards around the country are included, as well as a list of resources for further information. (EW)

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MSBA Technology Services Spring 1988
Special Topic Workshop

Microcomputer Telecommunications

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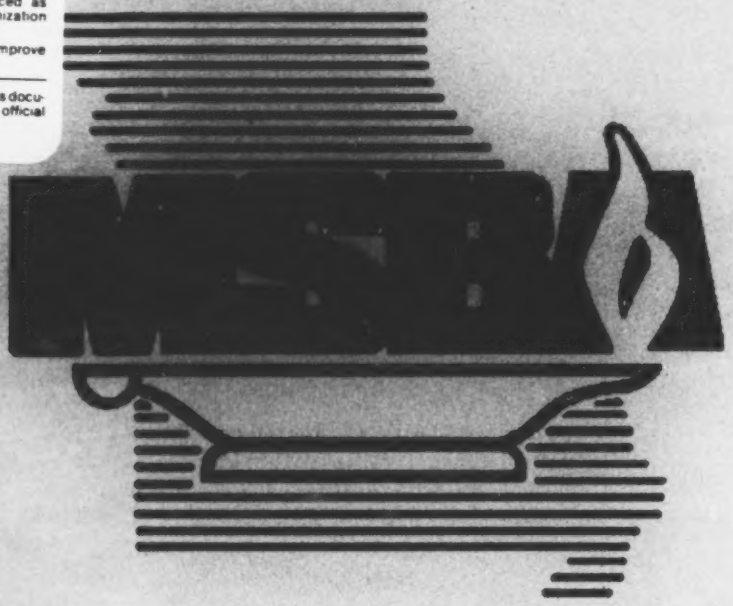

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Microcomputer Telecommunications

MSBA Technology Services

1988 Spring Special Topic Workshop

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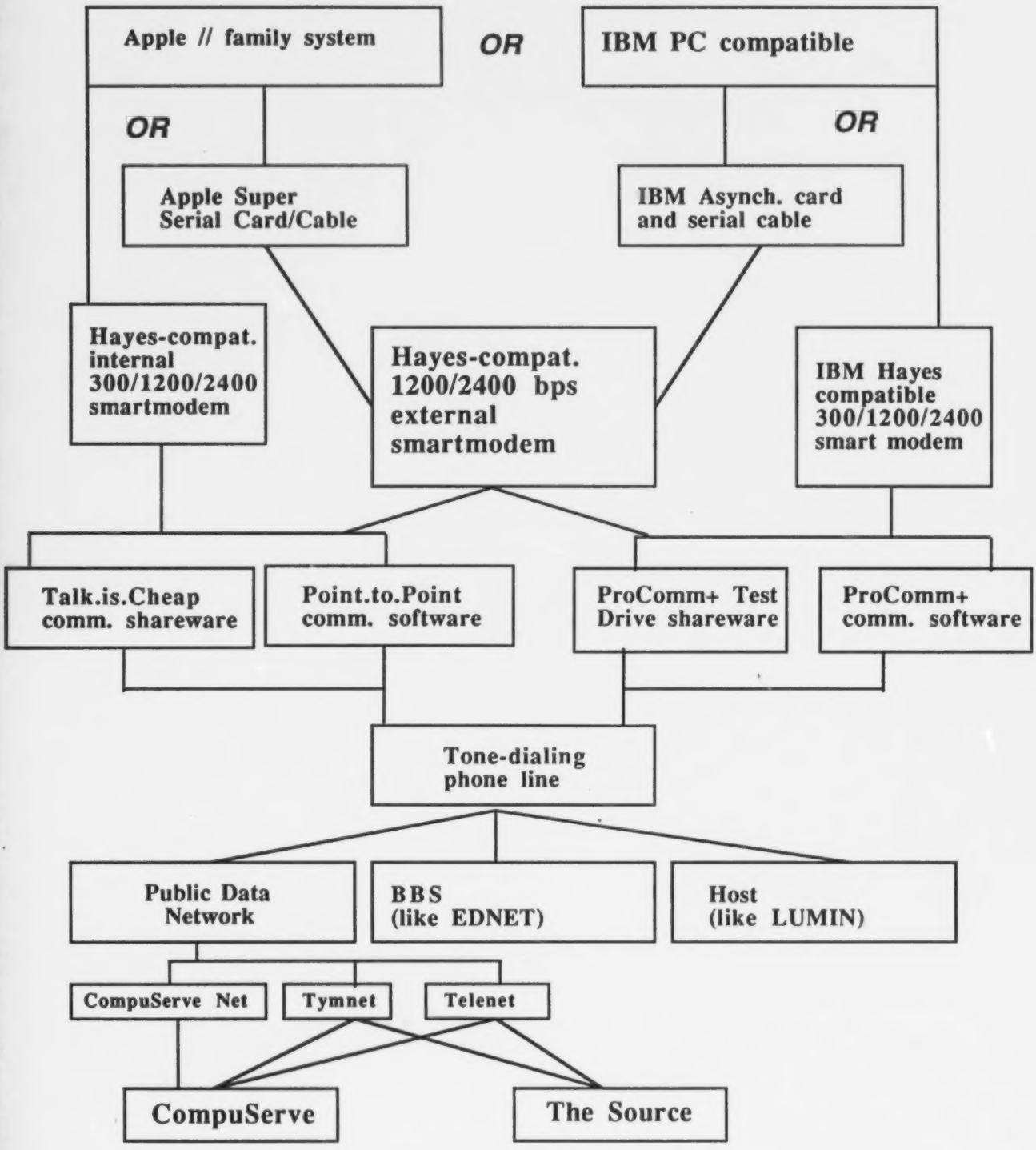
Connection Decision Chart



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Session Objectives and Agenda

Session Objectives:

•To identify basic concepts and elements of telecommunications .

•To identify the most important telecommunication software and hardware features.

•To define basic telecommunication terms.

•To identify major providers of electronic information services.

•To identify and provide solutions to the most common problems encountered when attempting to communicate with other computers from remote locations.

•To provide step by step directions for transferring files from one computer system to another.

•To identify the most common communication protocols and provide information on transferring files using these protocols.

Agenda

I. *Presentation and Demonstration*

A. Identify and discuss basic telecommunications concepts

B. Identify and dicuss specific elements of a telecommunications system

C. Discuss evaluating and choosing hardware and software

D. Discuss evaluating and choosing online services

E. Demonstrate and discuss typical dial-up sessions

1. University of Missouri's LUMIN library catalog, a host
2. MSBA's EDNET bulletin board system
3. CompuServe, a large general information system

II. *Break/Refreshments*

II. *Hands-On Activities*

ACTIVITY 1: Sample Dialup Session using IBM PC and ProComm+
Data Transfer Between Microcomputers

ACTIVITY 2: Apple Hardware/Software Setup and Configuration
IBM Hardware/Software Setup and Configuration

NOTE: *Participants will be broken into two groups for the hands-on sessions, so that each participant will be able to work on both activities. Each session will run twice to accomodate this.*

Why Telecommunications?

Telecommunications is probably the most powerful option you can add to a microcomputer. Once your computer can talk to other computers via the phone lines, a whole new world of information opens to you. That world might include:

√talking cross-country via "e-mail" to someone you share a common interest with

√downloading a free piece of software that helps you manage your financial records

√gathering an exhaustive list of bibliographic citations for a research project

However, the question facing educators is **how** and **why** to incorporate telecommunications in their school districts.

This workshop will help with the **how** part of the problem. Most computers can fairly easily and expensively be equipped to communicate over phone lines. The software which lets communication take place can be obtained inexpensively or for free through shareware or public domain channels.

As to the **why**, consider a few sample applications:

√*business classes* can track the stock market closely with their computers, getting historical as well as current data

√*library classes* can dialup free online University card catalogs to help them search for books

√*electronic mail* ("e-mail") allows administrators or teachers geographically distant from one another to send messages back and forth instantaneously, without playing "telephone tag"

√*students (or faculty) who are doing research* can call bibliographic retrieval databases to gather citations, or, in some cases, the full text of the article(s) they need

√*gaps in a school's instructional and administrative software "library"* can be easily and inexpensively enhanced with the wealth of public domain software available through online services

√*students (or faculty) with special interests* can find SIGs (special interest groups) online which can supply discussion, provide information, answer questions, and often furnish software

Are you curious? Read on, and welcome to microcomputer telecommunications!

- *Baud Rate*: Most HOSTs will adjust to the speed that the remote (your) computer system is sending; however, many times the host needs a Return or Enter from the remote computer after establishing the connect to test the speed. Hence the first thing you do after connecting to the host is press the enter key.

- *Protocols*: Two aspects to remember: it's not necessary to concern yourself about protocols if your just browsing information on the Host. However, if you intend to transfer files from the host to your computer then you need to consider using protocols: if it is necessary for you to send or receive information exactly as it exists prior to transferring then you need to select a protocol that assures an error free transfer (i.e. XMODEM, Kermit, Telink, etc.). If you intend to transfer files but are not concerned about occasional garbage in the information then you need not concern yourself with one of the error controlling protocols; you can simply send or receive your information in an ASCII format.

- *Duplex*: Often a point of confusion. Duplex is something that makes traffic over the telephone lines more convenient for communications. Generally speaking full duplex is what is most often used.

- *Local Echo*: This is used to confirm how keyboard strokes are echoed. If local echo is on then you will see your keystrokes appear on the screen being echoed back by your modem. If local echo is off and you see you keystrokes, then the host is echoing your keystrokes. If you see your keystrokes echoed back twice (i.e. AATTDD, RRIICCKK, etc.) then your modem and the host are echoing back, you should turn your local echo off.

- *Bit Configuration*: the DATA WORD FORMAT or how each character of data will be sent through the modem. Both the host and the computer must agree on how data will be represented. Standard ASCII communications generally use 10 Bits per character sent. (i.e. 300 Baud (BPS) 30 characters {not words} per second (CPS), 1200 BPS = 120 CPS, 2400 BPS = 240 CPS).

  -*Start/Stop bit:* The bits of data that mark the beginning and end of a character. Generally, you will see 1 start/stop bit meaning the stop bit marks end of the previous character and the start of a new character.

  -*Number of Data Bits*: The number of actual data bits used to represent a character. The ASCII standard defines all possible characters with 7 bits, therefore there must be a minimum of 7 bits. Often times you will see the data bits defined as 8 bits this adds flexibility to the host system thus allowing for "Tokenized Files" or non ASCII text files to be sent (i.e. 1-2-3 templates, computer software, etc.).

  -*Parity Bit*: a bit that is used for error checking. Parity checking has five alternatives: Mark = 1, Space = 0, Odd =1/0, Even = 1/0, or None = N/A. In reality this bit is often ignored and more complex methods such as protocols are used to provide error checking.

  EXAMPLE: EDNET requires 8N1 or 8 data bits, no parity checking, and 1 start/stop bit for a total of 10 bits.

Error-Correcting File Transfer Protocols

Why do you need file transfer protocols to telecommunicate? Think of the difference between executable program files and text. Imagine a typed page produced by a typewriter that can't cross the top of the letter "T". As you read the page, the T will look like an I or an l. However, your eyes are "smart" enough to read the letter in the context of the word. If you saw a passage about a "leaf on a lree," you would probably read it to mean "leaf on a tree." That is, in an ASCII text file (like that typed page), you are fairly forgiving of errors as a reader.

Just the opposite is true of your computer. When it reads program files, which are in a binary, non-ASCII format particular to your make of computer, the slightest mistake can keep it from executing properly, or stop it from executing at all.

What complicates this issue is that the phone lines we routinely send and receive binary files over were not really designed for data traffic, but instead for much less demanding voice traffic. Thus, you are likely to find a noisy phone line (one that introduces errors or garbage into the data flow) many times as you're downloading or uploading files.

What an error-correcting protocol does is provide a constant monitor of the data's progress from host to remote. The host sends a packet of data to the remote, then "asks" the remote if the size of the packet received was the same as the size of the packet sent. If not, the packet is resent until a "clearn" transmission is made.

Why are there so #$%!!&!! many file transfer protocols to worry about? There are many standards in the file transfer protocol world. The main differences between them is the type of system they were designed to accomodate, the size of the packets sent, the sophistication of the error-correcting algorithm, and the relative speed and efficiency of the protocol. Your software should support as wide a range of protocols as possible to ensure that you can download files from any system you come across.

Some Popular Error-Correcting Protocols

XMODEM--as close to a standard protocol as there is; available on many kinds of machines
YMODEM--faster than XMODEM; good for relatively "clean" phone lines
ZMODEM--highly efficient and fast "smart" protocol; the best general protocol for PCs

Kermit--many versions of Kermit facilitate transfer between large systems and PCs
Telink--special protocol supported by BBSes running the Fido or Opus software
CIS-B--CompuServe Information Service binary file protocol; best protocol on CIS

Planning Purchases

Hardware Needed for Online Connection

ITEM	PRICE RANGE
-1200 or 2400 baud (bps) MODEM	
-Bell standard for 300/1200	
-CCITT standard for 2400	
-Hayes command set compatible	
-Connects directly to phone line	
-Autodial and autoanswer	
-Repeat or "attack" dialing	
-Extra jack to attach telephone	
-Speaker with volume control	
-Easily accessible DIP switches	
-Internal (cheap, takes up less space, no cable)	
-2400 bps	$180-$250
-1200 bps	$80-$150
-External (portable, indicator lights)	
-2400 bps	$200-$300
-1200 bps	$100-$200
-cable for external modem	$15-$30

SUGGESTED BRANDS: Hayes (expensive, industry-standard), US Robotics (reliable, mid-range pricing), Zoom Telephonics (inexpensive, compatible), Practical Peripherals (inexpensive, reliable), Everex (inexpensive and very compatible).

-SERIAL (RS-232) CONNECTION may have to be added to your computer for an external modem hookup. For an Apple, this requires an Apple Super Serial Card or equivalent; for an IBM, an Asynchronous Communications Adaptor or equivalent. The Macintosh already includes a suitable port, but you will have to purchase a special Mac-to-modem cable.

Additionally, *tone-dialing phone service* and *fiber-optic long distance* is desirable. The quality of your communications is in large part due to the quality of your local phone lines, so even the best long-distance service won't help if your local lines are perpetually noisy.

Software Needed for Online Connection

ITEM		PRICE RANGE
For Apple II family:		
Commercial Product: Point.to.Point (Pinpoint)		$120
Shareware Product: Talk.is.Cheap		$30 (reg. fee)
For IBM family:		
Commercial Product:	ProComm Plus (Datastorm)	$75
Shareware Product:	Boyan D-3	(reg. fee)
	QModem SST	(reg. fee)
	ProComm Plus Test Drive	(reg. fee)

Necessary/desirable features of any communications software:

-dialing directory with at least ten numbers
-keystroke "macros" to record commonly used command strings
-"capture screen to disk" function (also known as screen logging)
-status line onscreen
-uploading and downloading with file transfer protocols
-as many error-correcting file transfer protocols as possible, including:
  --XMODEM
  --YMODEM
  --Kermit
  --Telink
-as many terminal emulations as possible, including:
  --IBM 3101 and 3270 (mainframe)
  --ANSI (or generic)
  --VT100
  --various TeleVideo terminals
-on-line help facility
-script language for designing automated logons
-file management, viewing and editing without leaving program
-queued redial of busy numbers

Choosing Online Services

Types of Online Services

1). ***Host***: Though technically any system you're connected to becomes a host, "host" generally refers to a large mainframe environment. An example is the University of Missouri's mainframes UMCVMB. Hosts require your software to emulate a terminal native to that system (like an IBM 3278 in UMCVMB's case). If you use LUMIN, a product available on UMCVMB, you'll be working with a host. Hosts offer specific and often proprietary university or corporate information, like library card catalogs or demographic data, and usually require special permission (setting up an account, etc.) to use.

2). ***BBS***: The last few years have seen an incredible proliferation of local bulletin board services (BBSes). Often run by individuals or small companies, BBSes usually run on microcomputers. MSBA's EDNET is a BBS which runs on an IBM XT, for example. Generic terminal emulations are all that is required run under a BBS. BBSes offer advantages in that they require little special permission to use (some sysops, or system operators, will call you to chat before giving you access to their system) and that they make available a huge array of free or "shareware" software for a variety of different machines. EDNET, for instance, now has IBM shareware available and will soon have Apple, too. BBSes also offer electronic mail for and information specific to a certain interest group: EDNET is aimed squarely at school administrators, offering legislative updates, superintendent search data, MSBA news, and much more. Downloading software from BBSes requires your communications software to support error correcting file-transfer protocols like Kermit, XMODEM, Telink, etc. Most BBSes are free except for long distance charges; some of the more popular are now opening "pay" nodes to help support the cost of their operation.

3). ***Commercial information service***: These range from general-interest, low-cost services like CompuServe and The Source to more expensive, specific data brokers like Dow-Jones News/Retrieval, Dialog and Bibliographic Retrieval Service (BRS). Running on large mainframe systems, these services (often known as EISes, or Electronic Information Services) provide a bewildering amount of information, mail, and software. After an initial sign-up fee, users pay a per-minute charge for connect time, which may include communications surcharges. Some specialized subservices also charge a premium, and the bibliographic retrieval systems charge per search, with "misses" being charged a flat fee.

A Sample of Available Online Services

The well-connected school should have access to a sampling of all three types of electronic information sources to supplement its traditional sources of information.

HOST

University of MO computer systems: Offering a variety of large IBM mainframes and applications strategically located at UM campuses, the UM computer system is an excellent host system if you're close to one of its nodes. School districts and companies can set up private accounts and buy time on the system (usually UMCVMB). UMCVMB's communications (and its users' abilities) are enhanced by its being tied to BITNET, a large multinational computer data network with ties to all the other major networks, including ARPAnet, the Department of Defense's network. A free service of the UM systems is LUMIN, the Library Information Network of the University of Missouri. Comprised of an electronic card-catalog listing more than 3/4 million volumes of the statewide UM campus system's library holdings, LUMIN can be accessed and searched by anyone with a modem. An excellent resource for school libraries and librarians.

CONTACT:	UMC Computing Services	(314)-882-2112
	UMC Computing Help Desk	(314)-882-7686
	LUMIN (300/E/7/1)	(314)-882-8851
	LUMIN (1200/E/7/1)	(314)-884-4224

COST: LUMIN is free except for long distance charges. UMCVMB accounts are charged by amount of storage space, connect time, print jobs, etc.

BBS

Missouri School Boards Association's EDNET: targeted specifically at school administrators, EDNET offers a range of useful information. Electronic mail connects administrators around the state. Conferences, or specialized information areas, allow those with special interests to get to the information they need quickly. Currently conferences include Legal Services, Legislative Update, Superintendent Search, Technology, and MSBA News, among others. Each conference includes bulletins which contain timely, no-nonsense information. Additionally, IBM (and soon Apple) shareware and free software may be downloaded. EDNET is online 8AM-5PM Monday-Friday.

CONTACT:	Mike McClaskey, MSBA	(800)-221-MSBA (6722)
	EDNET (3/12/2400/N/8/1)	(314)-445-9981

COST: Free except for long distance to all MSBA member districts

The Missouri School Board: Not affiliated with MSBA, this BBS operates 24 hours a day, 7 days a week and is dedicated to use by teachers and students. Working off a grant from Tandy Corporation, the system features electronic mail, bulletins, and shareware files for Apple and IBM.

CONTACT:	Ernest Ferguson	(417)-326-5281 (ext. 427)
	BBS (3/1200 bps)	(417)-326-6687

COST: Free except for long distance to all interested parties

(For additional BBSes of general interest, see the **Computer Phone Book.**)

Electronic Information Service

CompuServe: the "First Choice of a Network Nation," as their slogan goes, CompuServe boasts the most subscribers of any information service in North America. They go back all the way to 1969 (that's a lifetime or two in the computer industry) and are now owned by H & R Block. Their services include Bulletin Boards for special interests, financial news and information, financial transaction services, electronic shopping, personal computing forums, business information (demographics and conferences), news/weather/sports, travel services (including the Official Airline Guide), entertainment/games, home/health/family, and education/reference. Two exciting features of CompuServe are its e-mail links to MCI Mail, the premiere business e-mail service and its window to IQuest, a bibliographic search service combining links to the more popular sources like BRS and Dialog. CompuServe is highly recommended as a general service. Connection is made via a local call to a CompuServe or Telenet network node (available in several locations around the state) or a toll-free call.

COST: about $25 buys a subscription pak and manual which includes a voucher for $25 worth of free connect time. 300 baud users are charged $6.00 an hour connect time; 1200 bps is $12.50 an hour; additional telecommunications charges depend on method of connection. Some services require additional connect fees. Greater flexibility is allowed under the Executive Service Option, which requires a $10 per month minimum usage fee.

CONTACT: CompuServe (800)-848-8990

The Source: Owned by Readers' Digest and the second biggest EIS, The Source is aimed more at business people than the general home user as is CompuServe. Thus its emphasis is becoming more and more focused on providing information to groups like school administrators. Its SAMIN (School Administrators' Management Information Network) is a sample of a good specialized source of information. Additionally, it has a "member publishing" component which allows users to form their own BBSes on The Source. One recent addition from Missouri is MISSOURI REVIEW ONLINE, an electronic edition of the highly acclaimed Missouri Review literary magazine which originates at UMC. Otherwise, its services are very similar to those offered on CompuServe. It is reached via Telenet or Sourcenet.

COST: Subscriptions cost about $49 regularly, but there are specials in which the subscriber only pays for a manual.

300 bps: $0.36 a minute prime, $0.14 a minute non-prime
1200 bps: $0.43 a minute prime, $0.23 a minute non-prime

2400 bps service available in some cities; special interest groups (SIGs) have discounted rates; some surcharges apply.

CONTACT: The Source (800)-336-3366
The Source Help Desk (800)-336-3330

Dialog

Bibliographic Retrieval Service

Making the Connection: A Sample Dialup Session

1. User starts up his computer and boots the communications software. If an external modem is attached, it is powered up at this time. User checks modular phone cable connection to wall jack.

2. User configures communications software (see **Activity 2** for Apple computers, **Activity 3** for IBMs and compatibles). This requires setting various parameters that govern the transmission and receipt of data (see **Sample Configuration** section). To review:

> baud rate: speed of data transmission (ranges from 300-9600 and up)
> terminal emulation: determines how remote will "look" to host
> data and stop bits: the "data word" format which both host and remote will agree on
> parity: a bit used for error checking
> duplex and echo: how keyboard strokes are echoed between host and remote

3. User initiates communications (see **Activity 1**). He may give commands to customize the modem's internal settings (including whether to dial to tone or pulse phone lines). Next, he gets the modem's attention (in Hayes-compatible modems, with the AT command) and commands the modem to dial a phone number (which may have been stored in a dialing directory on disk) and listen for a connect signal.

4. Upon receipt of the high-pithced carrier tone on the other end of the phone line, the software indicates a connection has been made. The two systems synchronize. User performs the host logon, which may include giving account numbers, names, and/or passwords.

5. User checks his online mailbox on the host for new mail. He can read it online, download it for later reading, reply to it, forward it to another user, or discard it.

6. User composes a new message and sends it to another user whose name or account number he knows. (The other user receives the message in his mailbox almost instantaneously and may have time to reply while the first user is still online.)

7. User views a list of files available for downloading, which may include graphics, text, or software designed for his type of machine. He selects a file he wishes to download, starts the download on the host, then starts the download on his own machine, using an error-correcting file transfer protocol like XMODEM.

8. User performs any other necessary tasks, any and all of which control the host computer.

9. User logs off the host computer.

10. User exits his communications software.

Hands-On Activities

ACTIVITY 1, Part A: *IBM Dialup Using ProComm+*

Objective: You will be able to dial up a remote online service, read electronic mail, view other information, and download a file using ProComm+ after completing this activity.

Description: You will start up ProComm+, select a number from the dialing directory, double check correct line settings, and dial MSBA's EDNET. Once there, you will login, read mail, read a bulletin, and download a file using a file transfer protocol.

Procedure:

1). The ProComm+ program is in the \PCPLUS subdirectory on the machine's hard disk. Type CD\PCPLUS <-' and then PCPLUS<-' to start the program. Watch the modem's lights as the program loads to confirm that the software is talking to the hardware (the SD and RD lights should flash and the MR and TR lights should come on).

2). Enter the dialing directory. Select by highlighting the directory entry for EDNET. Briefly view its line settings: they should be 8 data bits, No parity and 1 stop bit. 1200 baud should be the speed. To change the settings, type R to revise them, otherwise press enter once you've highlighted the number.

3). The modem will dial via tone. You should hear the EDNET computer's number ringing, and then the shrill, high-pitched carrier tone of the EDNET modem. ProComm will give a "connected" indicator. If the screen is blank, press enter.

4). You don't want graphics. Enter your name as directed. When choosing a password, make sure it's one you can easily remember. On the other hand, it's bad practice to use your own name or the names of close family members--don't make it TOO easy for password thieves to guess. For your protection, the password will not appear onscreen. You'll be asked for a file transfer protocol. Choose one that both PCBoard and your software have--XMODEM is almost always a safe choice, but many prefer YMODEM, which PCBoard and ProComm+ can also accomodate. When you reach the main menu, review your choices.

5). You are in the main board now. To read some electronic mail (e-mail), type Read. You want to read all mail since you were last on, so type Since (all these commands will work with just the first letter, by the way). You've never been on EDNET, so the Since command shows you all the mail that's available. You can read through it just by pressing enter at the More prompt. Type N to stop reading mail.

6). Now you want to enter some new mail. Type Enter to start a new message. Send a message to the SYSOP. Type a brief descriptor of what it's about. You don't need any special security, so type another return. Next, type your message. The PCBoard editor is smart enough to do word wrapping just like a word processor, so you don't have to type carriage returns at the end of a line. To end the message, type a carriage return on a blank line. Then choose Save to save your new mail. You'll be returned to the main menu.

(Continued)

7). Next, try reading a bulletin. Enter B to see the list of available bulletins. Press the number of the bulletin you want to read and it will scroll by one screenful at a time. Let's say you wanted to read a bulletin AND save it to a disk file you could work with in your word processor later--all at the same time. Use ProComm+'s Log facility. Get to the main menu of EDNET again (often pressing return a couple of times on blank lines will do the trick). Type B to display the list of bulletins. Now press Alt-F1 to open the log. You'll be asked for a filename to save the log under (try TEST and press enter). Now go ahead and type the number of the bulletin you want to read. As it goes by, it will be written to disk. After you're done reading, press Alt-F1 again to close the log.

8). Finally, you're ready for the big time--a real file download complete with error-checking file transfer protocol. From the main menu, press F for the list of Files. Choose area #2, Downloadable text files. The list of files available to send to your computer will appear. Choose a small file, MR10-15.ARC to download. First press D to download, then type the name of the file complete: MR10-15.ARC. When instructed to begin the download procedure, press the PgDn key, ProComm+'s download key. ProComm+ will pop up a box with several transfer protocols to choose from. Choose whichever protocol you specified when you logged onto EDNET. Next, ProComm+ will ask you for the name of the file as you wish it to appear on your machine. Type MR10-15.ARC again. Watch the download begin. ProComm+ pops up a status window that shows you the download's progress, then beeps when it's complete. Press return to go back to the main menu after the transfer is successful.

9.) It's time to say goodbye. Thus, type G for goodbye to log off EDNET. Hang up the modem (and the phone line) by pressing the ProComm+ hangup key, Alt-H. The lower left corner of the screen will say DISCONNECTING and then you're offline.

10). Congratulations. You're now able to navigate almost any BBS you'll come across.

ACTIVITY 1, Part B: *Data Transfer Between Machines*

Objective: This activity will prepare participates to understand the concepts and procedures needed to transfer data between two computers.

Description:This activity will demonstrate necessary cabling and communications software configurations to transfer data between two computers. Specifically, this activity will use a TRS-80 laptop computer and a IBM PS/2 Model 25 to demonstrate how information can be passed from one ASCII machine to another ASCII machine with differing operating systems.

Procedure:

I. Attach cable from TRS-80 computer's "RS232C" port sometimes called serial or asynchous communications port to the asynchonous communications port on the IBM PS/2 Model 25.

II. TRS-80 Model 100

1. Turn on TRS-80 computer (Switch on Right Side).

2. Select telecommunications program by moving arrow to highlight "TELCOM" and pressing ENTER.

3. Be sure that the top left corner reads:"87E1E,10pps. If not press F3 and type "87E1E" and press ENTER. This represents the communications configuration which is set for 9600 BPI, word length of 7 bits, Even parity, 1 stop bit, and Enable Xon/Xoff Status.

4. Press F4 to Enter TERMinal mode.

III. IBM PS/2 MODEL 25

1.Turn on IBM Model 25 (Switch on Front Right).

2. Procomm Telecommunications program will boot automatically. (Press Space Bar Twice to Clear Screens).

3. Press ALT-Q to enter HOST mode.

IV. TRANSFERRING INFORMATION FROM THE TRS-80 TO THE IBM PS/2. Press the pagedown key on the IBM, type 4 for ASCII, enter filename for IBM file i.e. test or junk, press ENTER. Using the TRS-80 type F3 to upload a file. When asked FILE TO UPLOAD? Type "SAMPLE.DO" and press ENTER. Press ENTER when asked for WIDTH. Typing the ESC key you end the download on the IBM, the IBM file is saved and can be viewed by typing ALT-V plus the filename.

V. TRANSFERRING INFORMATION FROM THE IBM PS/2 TO THE TRS-80. Press F3 on the TRS-80 to DOWNload file, enter a file name i.e. IBM.DO or test and hit enter. From the IBM press pageup key, enter the filename "READ.ME" and press ENTER. Which on the screen of the TRS-80 as information is being transferred. You can press the F8 key to return to the menu and select the file that was transferred to be viewed. Given enough time investigate the ALT-Q command on the IBM and see how you can turn your IBM into a HOST machine.

ACTIVITY 2, Part A: *Apple Hardware/Software Setup and Configuration*

*Objective:*You will understand the necessary parts and procedures for assembling an Apple telecommunications system including hardware and software.

*Description:*Beginning with a unconfigured Apple, you will add necessary hardware and attach a modem, then start the software and configure it for the necessary settings.

Procedure:

1). Examine the rear panel of the Apple for evidence of a serial port: on most Apples it is a female 25-pin connector.

2). If the Apple lacks a serial port, install an Apple Super Serial Card in the computer. POWER OFF THE SYSTEM UNIT! Now, remove the cover from the system unit and identify the expansion slots. The best slot for the serial card is generally Slot 2.

3). Following the manufacturer's instructions See Manual, set the many switches necessary on your serial card and install it in an empty slot, keeping in mind 2) above. The black jumper on the card should be set so that its arrow points UP for use with a modem (set it DOWN for a printer).

4). Obtain an appropriate RS-232 serial cable to connect the card to your modem. The cable will be 25-pin male (Apple end) to 25-pin male (modem end) generally.

5). Attach the cable to your Apple and modem. Attach the modem to the phone line with a standard modular phone cable. Many modems allow you to attach a phone to their other jack. Make any switch settings necessary on the modem.

6). Insert your software disk and power on the computer. After it boots, power on the modem. Start Point.to.Point by typing -PTP.SYSTEM,S6,D1. The RD and SD should flash as Point.to.Point initializes the modem; the MR and TR should remain lighted after startup.

7). Once insidethe program, you'll be asked for some setup information. Highlight the option you want to change, and press ENTER. Move through the screens with the cursor keys, pressing enter when you want to change something. Set Modem Slot Number to the slot which you installed the serial card in. Set Modem Interface Type to STANDARD.6551. Escape and you're ready to run the program.

8. Now add a new number to the dialing directory. Enter the EDNET number: 445-9981, 8 data bits, No parity, 1 stop bit. Press enter until you save the new number.

9. Now test the dailing and settings you can attemp to dail, although you don't have a connection to a real phone line. You should see the lights on the modem (OH and possibly others) flash. You will also hear the modem tone dial the EDNET number.

10. Your modem and software is successfully configuared.

ACTIVITY 2, Part B: *IBM Hardware/Software Setup and Configuration*

Objective: You will understand the necessary parts and procedures for assembling an IBM or compatible telecommunications system including hardware and software.

Desciption: Beginning with a unconfigured PC, you will add necessary hardware and attach a modem, then start the software and configure it for the necessary settings.

Procedure:

1). Examine the rear panel of the PC for evidence of a serial port: on most IBM PCs, XTs, PS/2s and their clones it is a male 25-pin connector. On PC ATs and their clones, it is a 9-pin male connector.

2). If the PC lacks a serial port, install an asynchronous communications adaptor (serial card) in the computer. POWER OFF THE SYSTEM UNIT! Now, remove the cover from the system unit and identify the expansion slots, which are identified by numbering them across from 1 to 8, left to right if you're looking across the disk drives towards the slots. Do not install a serial card (or any other communications device) in the "short" slots (7 and 8) unless it is absolutely necessary--even then, it may not work.

3). Following the manufacturer's instructions, set any switches necessary on your serial card and install it in an empty slot, keeping in mind 2) above. Secure the card with a screw.

4). Obtain an appropriate RS-232 serial cable to connect the card to your modem. The cable will be 25-pin female (PC end) to 25-pin male (modem end) generally; ATs are different, of course.

5). Attach the cable to your PC and modem. Attach the modem to the phone line with a standard modular phone cable. Many modems allow you to attach a phone to their other jack. Make any switch settings necessary on the modem.

6). Power on the PC. After it boots, power on the modem. ProComm+, the communications software, is installed on the hard disk in the \PCPLUS subdirectory. Type CD\PCPLUS and then type PCPLUS to start the program. WATCH YOUR MODEM'S LIGHTS: the RD and SD should flash as ProComm initializes the modem; the MR and TR should remain lighted after startup.

7). Once inside ProComm+, you'll come up in terminal mode. Press Alt-S to enter the setup procedure. Highlight the option you want to change, and press ENTER. Move through the screens with the cursor keys, pressing enter when you want to change something. You can toggle through a list of choices with the spacebar. Under Modem Options, select General Options and set #2 on the list (modem prefix) to the setting appropriate to your phone line, in this case, tone. The command must begin with the standard Hayes set ATtention Dial command, ATD, followed by a single letter indicating whether the dial on a pulse line (P) or a tone line (T). Thus, ATDT signals the modem to begin dialing in tone whatever number follows.

Continued

8. ESCape out of these menus after making the settings. Once in terminal mode, press Alt-D to look at the dialing directory. You can press R to revise a blank entry (thus entering your own number). Try R for entry #1. Enter the EDNET number: 445-9981, 8 data bits, No parity, 1 stop bit, terminal set to ANSI. Press enter until you save the new number.

9. Now highlight your newly entered number and press enter to begin dialing. You should see the lights on the modem (OH and possibly others) flash. You will also hear the modem tone dial the EDNET number.

10. Your modem and communications software is successfully connected.

A Glossary of Telecommunications Terminology

Electronic Mail (E-Mail): a messages service using computers and telecommunications to deliver information. Generally users connect with a large host computer via a remote system (often a great distance away) to edit, send, and receive messages.

Host: the computer that controls the e-mail system. The LUMIN host is a large IBM mainframe, for instance, while EDNET runs on an IBM XT. The host itself has a modem and communications protocol converter (if necessary) to answer and then communicate with the remote system.

Remote (or Local) System: the user's system. Can be a terminal or a microcomputer with telecommunications hardware. Used much like a television remote controller to manage the system.

Packet-switching networks: data-only telecommunications network which allows users to bypass traditional long-distance systems and connect with distant host computers. Telenet, Tymnet and CompuServe's network have local numbers in most large cities or can be reached toll-free for an additional connect fee.

Modem: an internal board residing inside the computer or an external box connected to the computer via a Communications Adaptor and RS-232C cable. It translates digital data from the computer into signals which can be sent over the telephone lines.

Modems may include error-correction protocols (standard specifications) which make allowances for noisy phone lines which produce data errors. The most desirable modems are *Hayes compatible*; 1200 baud or 2400 baud modem speed is becoming a necessity for general use.

Communications Adaptor (Serial Card or Port, Asynchronous Adaptor): an interface card which arranges the computer's signals into those understandable by the modem--allows data to be sent in a serial format. Provides physical connection point for external modem (not required for internal modem.). The external modem and communications adaptor are connected by means of an RS-232C cable; that is, a cable adhering to industry communications standard RS-232C and comprised of up to 25 pins on each end.

Communications Software: a program that controls the communications process and automates connection to the host. Software is machine-dependent and may include capabilities for *uploading* (sending data to the host), *downloading* (receiving data from the host), emulating host terminals, and error correction and efficient file transfer protocols (among the most popular are Kermit and XMODEM).

Recommended software is *PROCOMM+* for IBM PCs and compatibles and *Point-to-Point* for the Apple // family.

Resources for Further Information

Online
Steve Lambert
Microsoft Press softcover, $19.95

various books on communications
Alfred Glossbrenner

How to Get the Most Out of CompuServe
Advance CompuServe for IBM PC Power Users
How to Get the Most Out of The Source
Charles Bowen and David Peyton
Bantam Books softcover; most $19.95

Online Access
published bi-monthly; $24.95 per year
Online Access Subscriptions
5615 W. Cermak Road
Cicero, IL 60650
800-922-9232

OnlineToday
published monthly; free with CompuServe subscription

A Computer Telephone Book

Charlie's BBS Columbia, MO (314)-442-6023 (3/12/2400/N/8/1)
Excellent source of IBM shareware and computer advice

Computer Spectrum Columbia, MO (314)-882-4711 (3/1200/N/8/1)
Good source of shareware for different makes of computers, good user interface

ComputerTyme BBS Springfield, MO (417)-869-5294 (3/12/2400/N/8/1)
Small, well-run BBS

The Co-op Columbia, MO (314)-442-3676 (3/1200/N/8/1)
Mac and IBM software; excellent technical discussion and help

LAN Magazine BBS New York City (212)-691-1010 (3/12/2400/N/8/1)
More information about Local Area Networks than you can shake a stick at

Leisure Time BBS San Fernando, CA (818)-363-7612 (3/12/2400/N/8/1)
A very large and well-run PCBoard. Real estate conference, many other conferences.

Missouri School Board (417)-326-6687 (3/1200/N/8/1)
Information exchange for teachers; educational shareware

MSBA's EDNET Columbia, MO (314)-445-9981 (3/12/2400/N/8/1)
Information for school administrators and board members; shareware; e-mail

National E-Mail Directory (800)-622-0505 (3/12/2400/N/8/1)
An electronic white pages to find people's e-mail addresses. A pay service; sign-up online with a major credit card. There is a small fee per search thereafter.

PC-Rockland BBS East Coast (914)-353-2176 (3/12/24/9600/N/8/1)
Probably the largest source of IBM shareware available anywhere, comprising over 11,000 files. You must register and accept a collect call from the sysop to gain access.

Phoenix BBS San Jose, CA (408)-253-3926 (3/12/2400/N/8/1)
Macintosh System software, shareware, and gigantic library of graphics. Some can be used on the PC with special reader programs.

Travel Online St. Louis (314)-625-4054 (3/12/2400/N/8/1)
Interesting travel conferences, lots of public domain software, good topical e-mail

UMC Agriculture Dept. Columbia (314)-882-8289 (3/1200/N/8/1)
Good source of ag-oriented programs and information

WordPerfect BBS Utah (801)-225-4414 (3/12/2400/N/8/1)
Support for users of WordPerfect Corporation software. Includes fixes, patches, driver upgrades, technical help, product discussions/feedback, and more.

Missouri Public Data Network Access Numbers

CITY	Telenet	Tymnet	Compuserve
Bridgeton			314-731-8283
Cape Girardeau			314-335-1518
Columbia	314-449-4404	314-874-2771	314-445-4600
Florissant	314-421-4990		314-421-3102
Independence		913-384-0055	816-474-3770
Jefferson City	314-634-5178	314-634-8296	314-635-9170
Joplin		417-781-8718	
Kansas City	816-221-9900	913-384-0055	816-474-3770
Rolla		314-364-2084	
Springfield	417-864-4814	417-869-4903	
St. Joseph	816-279-4797	816-232-1455	
St. Louis	314-421-4990	314-731-8002	314-421-3102

(300/1200 bps; blank indicates not available)

"The Best BBSes:"
One User's Opinion

The following is the beginning of a list of what I feel are the BEST computer Bulletin Boards around the country. Realizing full well that each person will have a different set of priorities, I am including a 'justification' review text for each entry.

The most important part of this file is the justification text. This text should allow others to 'decide to try' or not. Please do enjoy the following great bulletin boards. Since I consider ZMODEM to be such a valuable transfer protocol, boards that offer it are specially noted.

Thanks,
Jim Robeson
Pacific Grove, CA

The following are grade -AA- boards.

202-547-2008 DC Washington Robert Blacher Computer Connections
1200/2400 PCBoard 11. w/ZMODEM

This is the home of the PD Software Reviews prepared by sysop. He reviews every uploaded file, and tells it like he sees it. Reviews for the last two years are available for search/review through a DOOR. There are no games here; the files are the most up-to-date in the country! And Mr. Blacher keeps a clean board, no junk here. Two nodes are available, but one is $$ supported only. This is a tough board on which to maintain a supportable upload/download ratio, be prepared to upload only your very best! This board is well worth the $35.00 donation for the second node.

213-471-2518 CA Brentwood Eric Newhouse The Crest
1200/2400 RBBS

This is the home of the Trojan Horse alerts that are distributed nationwide for the protection of all of us. You can be assured that the files here have been tested. There is a lot of activity on this board. The sysop has had trouble lately with a bad disk, but things should improve soon.

415-994-2944 CA Daly City Vern Buerg VOR RBBS
1200/2400 Modified RBBS-CPC 11.2

The busiest board in town! You will have to use your auto-dialer to get on to this one. And the 'allfiles' list un-arcs into more than one 360kb diskette! It includes descriptive comments on each. Everyone gets 45 minutes, uploads are not required. But use your time wisely. Mr. Buerg writes good software, and keeps a good board.

602-936-3058 AZ Phoenix Warren Lauzon Phoenix Techline
1200/2400/9600 PCBoard 11

Would you believe a COMPAQ 386 with 130 meg run by the City's Water Utility ? Not available during day shift. This is a good & fast system! Registration is required, but they have an auto-registration package in a DOOR. They don't keep many games, this isn't a kids board. But, for good files, and a good message base, try it.

707-792-0963 CA Petaluma Don Watkins CC RBBS
1200/2400 Modified RBBS-CPC 11.2 w/ZMODEM

This is one of those relaxing boards where the Sysop belives registration is as bad as copy protection! The board is his hobby, and is frequented by some of the best sharware authors. I ran into this through a recommendation by Vern Buerg on his board. Message base time does not count against your daily 50 minute allotment. Uploads are not required and you are a full user the first time you call. The files are up-to-date and clean. The DIR.ARC allfiles list has full descriptions.

The following are grade -A- boards.

207-766-2467 MN Northern Lights
1200/2400 w/ZMODEM

Very active board with very current file selections. Sysop is interested in new file protocols, etc.

216-381-3320 OH Cleveland PC Ohio
1200/2400

Big board, running two networked ATs for a total of four incoming lines. Mail registration required. Worth it!

415-571-6911 CA San Mateo D.Jones/D.Hewes LogOn San Mateo
1200/2400

This is the place to call when all the other lines are busy. There are seven lines available on the same number! There are many files here, lots of games. The uploads are shifted into the many directories regularly. There is a wide variety of files here, including quite a few Commadore files. This is a Public Domain Software Exchange board.

503-621-3746 OR Portland Chuck Forsberg TELEGODZILLA
1200/2400 Pro-YAM w/ZMODEM

The sysop wrote the X,Y, & Z modem transfer protocols in use by most boards. This is the place to come for the latest version of ZMODEM. Chuck also has written his own communications program ZCOMM, and a board system. There isn't much else here, but if you are serious about communications, you will visit this place.

602-899-4876 AZ Phoenix **Technoids Annonymous**
1200/2400 PCBoard 11

Lotsa files, good programming conference.

919-471-8048 NC Durham **Dave Miller** **R.T.A.**
1200/2400 RBBS **w/WXMODEM**

60 meg of files! A good up-to-date system. This is the old G.T.E. system. Dave was the sysop of the GTE board, and was given the OK to bring it home when they closed up shop. WXMODEM is available here.

The following are grade -B- boards.

212-769-4734 NY New York **HITECH**
212-769-4799 1200 **PCBoard 11.8**

Two nodes, has lots of PCBoard software.

303-494-0167 CO Denver **The Data Bank**
1200/2400

Not for the faint of heart. This board is open, the files aren't checked, so be careful. But, the clientel seems OK, and I've picked up some of my best games here. ARC'ing isn't required. A good place for a beginners on PCPursuit with immediate download allowed. You can get 60 minutes twice a day.

303-972-4181 CO Denver **MicroLink B**
1200/2400

Another board for immediate download, with 60 minutes for a first time user. For PCPursuiters looking for a wide range of files, specially games.

The following are "Utility" boards.

703-689-3561 DC Washington **Net-Exchange**
1200/2400

The home of PC Pursuit. Dial 202 on PCPursuit.

203-429-3784 **Mansfield Software**
1200/2400 RBBS-PC

The home of KEDIT & Personal REXX, for registered owners.

212-696-0360 **PC Magazine Interactive Reader Service**
1200/2400

For those goodies mentioned in the magazine.

314-449-9401 **DATASTORM Technologies**
1200/2400

The home of PROCOMM 2.4.2, for interested parties.
You can order with your charge card herein.

314-449-5071 **DATASTORM Technologies**
1200/2400

The home of PROCOMM 2.4.2, for registered owners.

314-442-6023 **Charlie's BBS**
1200/2400

Eclectic selection of sharable PC software. Registration required.

408-371-7654 CA **Brown Bag Software**
1200/2400/9600 PCBoard

714-369-9766 CA San Bernardino **Patriquin's BBS**
1200/2400

This is Norm Patriquin's own support BBS.

801-266-0328 UT Salt Lake **Salt Air BBS**
1200/2400

The home of PC Board Bulletin Board Service.
Order with your credit card.
Open to PCBoard sysops, otherwise private.

805-395-0650 CA Bakersfield **Mustang Software**
1200/2400

The home of WILDCAT Bulletin Board Service.

The following are "being tested" boards.

201-729-5377 NJ Newark **Sparta # 2**
1200/2400

Big message base/ hard disk info

201-729-7410 NJ Newark **Software Society**
1200/2400

Robert Blacher recommends this one.

316-684-8744 KN Wichita **Gizmo** **Information Booth**

1200/2400

The home of VERSAdial...

415-937-0156 CA Walnut Creek Wes Meier Walnut Creek BBS
1200/2400 WC BBS w/ZMODEM

The author of WC BBS, which is used here, on V.Buerg's board, and Don Watkin's board.

415-964-9039 CA Palo Alto Jay Fox S P A C E
1200/2400 PCBoard 11.8 w/ZMODEM

Stanford Palo Alto Computer Exchange

602-279-2673 AZ Phoenix Samuel Smith The Tool Shop
1200/2400 PCBoard w/ZMODEM

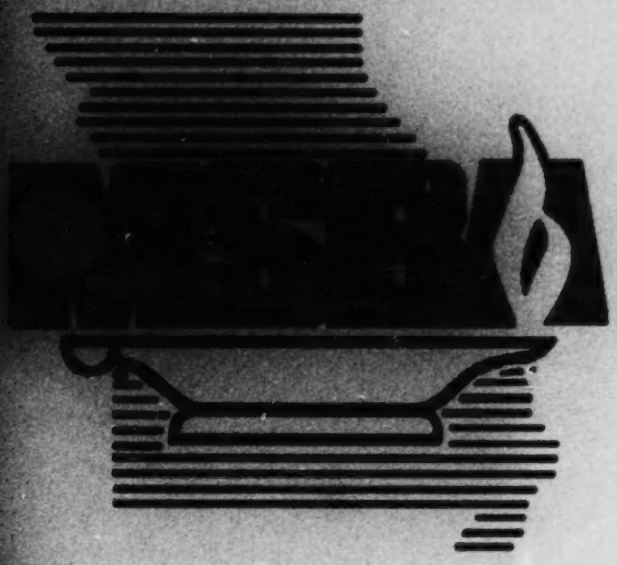
Specializing in software tools: Turbo Pascal, C, ADA.

608-251-7734 WI Madison CooperWorks BBS
1200/2400

Specializing in LASER printers/ desktop publishing.

For more information

about The Missouri School Boards Association's Technology Services,



Call:

Rick Mihalevich, Director
Mike McClaskey, Coordinator
Janet Turner, Technical Assistant
1-(800)-221-MSBA (6722)
1-(314)-445-9920

or Write:

Technology Services
Missouri School Boards Association
2100 I-70 Drive Southwest
Columbia, MO 65203

For additional copies of the software and access to other IBM and Apple public domain software, use your modem to call:

MSBA's EDNET
1-(314)-445-9981
300/1200/2400 bps
No parity, 8 data bits, 1 stop bit